

# Mechanism for CMOS Sensor Noise Elimination in Support of Resolution-as-a-Function-of-Exposure-Time Paradigm (RFET)

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## Introduction

Taking into consideration developments such as the ability to infer the median point of a light wave's strike against a sensor with finer granularity than the diameter of an individual CMOS sensor using frequency-morphing prisms sandwiched between a classical CMOS sensor and a translucent CMOS sensor in the forward position *ibid.* this author's previous work, it can be safely said that the factor that now limits CMOS sensor-driven image resolution is the level of sensor noise.

A light wave strike can be assigned to an extremely precise location in the visual field based upon meta-analysis of the time of arrival of a wave (as measured by the translucent CMOS layer) and the extent of distortion of the frequency of the light relative to its pre-morph frequency. Since the prism makes alterations to the light waves that vary from one atomic width to the next, naturally, we can make inferences about medial wave strike position at atomic granularity even if a sensor is 50nm in width provided the light can be "pre-observed" through the primary translucent layer in order to obtain a point of reference. CMOS noise is cumulative relative not only to sensitivity (voltage) but relative to exposure time, as well. In order to take full advantage of the RFET paradigm; likely to dominate for the foreseeable future; CMOS sensor noise must be, to the maximum extent possible, eliminated.

These sensors rely upon circulating electrical current through rounded square tracks composed of semiconductor materials. When photons interact with the free electrons, the voltage and amperage of those electrons are measurably altered. Unfortunately, the relative position of individual atoms of semiconductor material can cause a distortion in the voltage and amperage of that current independent of any interaction with light. Sensor apparatus, in their current incarnation, cannot distinguish between this distortion to the circulating current and distortions caused by interaction with actual light waves.

## Abstract

Distortions to the properties of circulating current in the detector bevel of a CMOS sensor caused by nanostructural characteristics i.e. "sensor noise" can be distinguished from those triggered by light waves by taking advantage of a telltale distinguishing feature between those modes of distortion.

Chance alignments of individual atoms of the material making up CMOS sensors tend to cause current flowing through the material to self-interact at the level of

individual electrons. This interaction causes the discrete magnetism of those electrons to alter the voltage property and can also result in SASE light generation, ultimately causing a spike in amperage accompanying that alteration to voltage. It is in this way that noise registers as a variety of colors and that individual sensor arrays have uniquely identifiable patterns of this noise that distinguish them from other arrays, given enough data for comparison. Unlike external-source light, however, this phenomenon results in the generation of magnetic moment that exceeds that of ordinary light-wave strikes.

While the SASE effect of the electron-self interaction results in the generation of modest numbers of photons that cannot be distinguished from the light being otherwise measured, the magnetic moment, if it were to be measured, could be used to identify individual SASE events. The square bevel design of the individual sensors lends itself to combination with a novel supporting structure that might be termed a Quantum Magnetometer Matrix/Electron Trapdoor Mechanism (QMM/ETM.)

While these SASE events happen over femtosecond-time scales that prohibit the logical handling of the identification and filtering of this sensor noise, a solid-state physical structure may successfully be used to divert portions of the CMOS electron stream to prevent their properties from being metered by the overall imaging mechanism.

An additional two square bevels (both on the outside and inside of the semiconductor track) composed of columns of rubidium atoms arrayed perpendicular to that track and collocated columns of hydrogen with variable positions governed by the magnetic alignment of the rubidium atoms form the basis of a Flexible Hydrogen Nanowire System (FHNS) that can selectively divert current over extremely short time-scales in response to minute spikes in magnetic moment. If this nanowire could be likened to a straw and the circulating current could be likened to a glass of water, the rubidium would act as a finger pushing the straw into the water and causing the extraction of water. This mechanism, when coupled with an existing CMOS sensor design, serves the dual function of reacting to abrupt but minute changes in magnetic moment in hyperlocalized regions of the electron stream and eliminates noise-corrupted portions of the stream through the diversion of current.

The final few protons in the FHNS nearest to the semiconductor bevel would be selectively nudged into sufficiently close proximity to the circulating electrons that a circuit would be conditionally opened, effectively removing the problematic portion of the stream. This could also be compared to a censor "bleeping out" foul language on pico- and nanosecond timescales.

Current from a position forward of the rubidium columns can be shunted in advance of the flowing electrons by including FHNS pathways that run parallel to the semiconductor bevel in addition to perpendicular. Current flowing through any proton results in parallel-track protons oscillating and opening up their own circuits; shunting energy both fore and aft of the point of detection

with a response time that, since it is based upon Coulomb forces, travels at 100% of the speed of light rather than the  $\sim 10\%$  of the flowing electrons, meaning that a proverbial trap door for electrons can be opened ahead of the electrons in response to their behavior at a point just behind the trap door.

## **Conclusion**

The proof-of-concept of zero-noise CMOS sensor technology would confer substantial benefits to the operator and constitute a new milestone in imaging technology.